Extending Rock Physics to the Cloud and Beyond

Ashley Zebrowski[1], Rosa Filgueira[2], Shantenu Jha[1], Malcolm Atkinson[2]

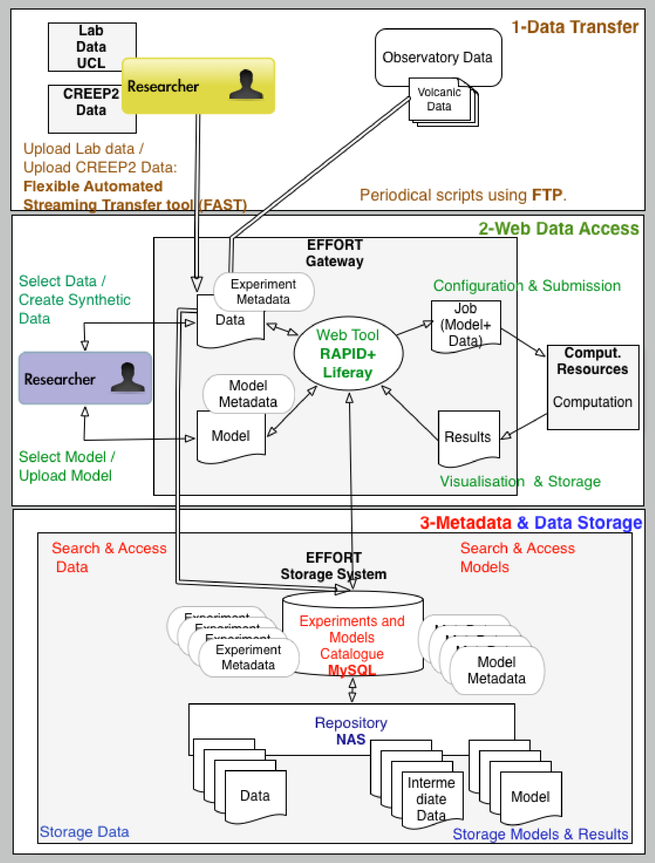
Rutgers University[1], University of Edinburgh[2]

Introduction

EFFORT rock physics forecast models made accessible through the EFFORT gateway allow for many scientists to execute scientific scenarios online. With the introduction of SAGA, their jobs and data can now be distributed to clusters and clouds, increasing the scale of execution and data volumes.

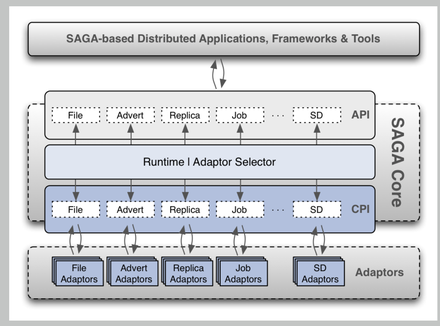
EFFORT Rock Physics

EFFORT is a multi-disciplinary collaboration which aims to determine the predictability of brittle failure rock samples in laboratory experiments.
EFFORT aims to explain how this predictability scales with regard to the greater complexity, physical scale, and slower strain-rates of natural world phenomena.
EFFORT consists of several main components: 1) rock physics forecast models 2) storage system composed by a repository and a database for storing models, experiment data and results. updated periodically via FAST and 3) a gateway to allow scientists to execute forecast models using data from the database and provide results.



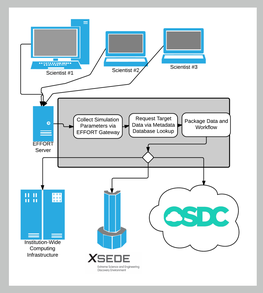
SAGA

SAGA (Simple API for Grid Applications) is an implementation of an OGF (Open Grid Forum) technical specification, providing a common consistent high-level API for interacting with distributed computing functionality. SAGA allows application writers to manage computational jobs, data, resources and more via an extensible, adaptor-based interface.



SAGA-EFFORT

EFFORT has been adapted to make use of SAGA. Separation of database queries from main forecast model execution has been accomplished so that data may be queried, retrieved, and packaged on the EFFORT gateway in advance, avoiding the need for potentially firewalled compute resources to communicate with the main EFFORT database. Creation of SAGA software to package EFFORT workflow and forecast model data for easy transport. Creation of SAGA script which contains information needed to transfer data and submit jobs to remote machines (e.g. hostnames, authentication info, queue names, allocation names) Modification of EFFORT gateway to execute SAGA-EFFORT script and distribute workflows/input data instead of running forecast model codes locally.



Results: Submission to Brand New Lands

Successful execution of rock physics simulations on OSDC and XSEDE (Stampede). More to come here...